SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 1.—"Researches on Modern Explosives: Second Communication." By W. Macnab, F.I.C., and E. Ristori, Assoc. M.Inst.C.E., F.R.A.S. Communicated by Prof. Ramsay, F.R.S.

The object of the experiments was to endeavour to find a means of determining more accurately than has hitherto been done the temperature reached when an explosive is fired in a closed vessel.

A modification of the method developed by Sir W. C. Roberts-Austen was employed. A thin platinum wire was melted by the heat of the explosion, but a thick wire was unaltered. This showed that the temperature reached was above the melting point of platinum, and also that the duration of the maximum temperature was very short. From this it was argued that if rhodium-platinum couples of different diameters, sufficiently thick not to be melted during explosion, were used in a bomb, the deflections of the galvanometer indicated would vary inversely with the sizes of the wires forming the couples; that in this way data might be obtained from which might be calculated the deflection of an infinitely thin couple, which could be capable of taking up the heat in an infinitely short time, and that this deflection expressed in degrees would represent the actual temperature reached.

Couples formed of wires of pure platinum and platinum alloyed with 10 per cent. of rhodium, varying in diameter from 0·01 to 0·044 of an inch, were employed. Each couple was successively fixed inside the bomb, and on firing the explosive the deflection of a spot of light reflected from the mirror galvanometer was photographically recorded.

These records show the uniformity of the results, and also the time occupied in heating each couple to its maximum, and that the deflections are in inverse order to the thickness of the couple used.

Two series of experiments made with two different explosives—ballistite (composed of 30 per cent. nitroglycerine and 70 per cent. gun-cotton) and gelatinised gun-cotton—were carried out with a number of different couples, and the results expressed as curves show the gradual rise of the deflections as the thickness of the couple diminishes; but all through the gun-cotton curve is below the ballistite curve, thus indicating that the temperature reached during explosion of the gun cotton is lower than that of the ballistite.

Experiments made with the following explosives showed that the relative temperature can be easily ascertained. Gun-cotton gave the lowest temperature, and in order came cordite, ballistite (composed of 70 per cent. soluble nitro-cotton and 30 per cent. nitroglycerine) and ballistite (composed of 50 per cent. soluble nitro-cotton and 50 per cent. nitroglycerine).

Another series of experiments is in progress for determining the other necessary elements which will be required before the value of these deflections of the galvanometer can be accurately expressed in degrees of temperature.

April 5.—"Über Reihen auf der Convergenzgrenze." Von Emanuel Lasker, Dr. philos. Communicated by Major MacMahon, F.R.S.

Linnean Society, April 19.—Dr. A. Günther, F.R.S., President, in the chair.—On behalf of the Hon. Charles Ellis, the President exhibited photographs of a large tree, *Taxodium distichum*, growing at Oaxaca in Mexico, and of another gigantic tree, a native of Cambodia. The circumference of the former, at a height of 3 feet from the ground, was stated to be 143 feet, while the height was estimated to be not more than 100 feet. The native name for this tree is *Sabino*. Mr. Daydon Jackson read an account of it, quoting from Loudon's *Mag. Nat. Hist.* vol. iv. (1831), p. 30, and Humboldt's "Views of Nature," p. 274. The second gigantic tree, which could not be satisfactorily determined from the photograph, had been observed growing on the Makong River, near the celebrated ruins of the great city of Angkorwat in Cambodia.—Messrs. W. B. Hemsley and H. H. W. Pearson read a paper on some collections of high-level plants from Tibet and the Andes. Mr. Hemsley first gave a brief history of the botanical exploration of Tibet, followed by an account of the unpublished collections presented to Kew by Captain Wellby and Lieut. Malcolm, by Captain Deasy and Mr. Arnold Pike, and by Dr. Sven Hedin. These collections were all made at great altitudes in Central and Northern Tibet; few of them below 15,000 feet, and some of them at 19,000 feet and upwards. The highest point at which flowering plants had been found was 19,200 feet above the level of the sea. The plants recorded by Deasy and Pike at altitudes of 19,000 feet and upwards are:—*Corydalis Hendersoni*, *Arenaria Stracheyi*, *Saxifraga parva*, *Sedum Stracheyi*, *Saussurea bracteata*, *Gentiana tenella*, *G. aquatica*, an unnamed species of *Astragalus*, and an unnamed species of *Oxytropis*. These are the greatest altitudes on record for flowering plants. Deep-rooting perennial herbs having a rosette of leaves close to the ground, with the flowers closely nestled in the centre, are characteristic of these altitudes. The predominating natural orders are:—Compositæ, Leguminosæ, Cruciferæ, Ranunculaceæ and Gramineæ. The Compositæ largely predominate, and the genus *Saussurea* is represented by numerous species. Specimens of about a dozen species were shown to illustrate the great diversity exhibited by this genus in foliage and inflorescence. Liliaceæ and the allied orders were very sparingly represented. Two or three species of onion occur; one of them, *Allium Semenovii*, in great abundance up to 17,000 feet. None of the collections contained any species of orchid.—Mr. H. H. W. Pearson described the Andine flora, with special reference to Sir Martin Conway's small collection of plants brought from Illimani in the Bolivian Andes in 1898. In consequence of the labours of d'Orbigny, Pentland, Meyen, Weddell, Mandon and other botanists, the high-level flora of the mountains of Bolivia is better known than that of any other equally elevated region of the Andes. Weddell's collections form the nucleus of the materials from which the "Chloris Andina"—the classic work on the flora of the High Andes—was prepared. Many collectors have obtained plants in various parts of the Andes at elevations stated to be greater than 17,000 feet. Colonel Hall states that he saw four plants on Chimborazo in 1831 at "nearly 18,000 feet." These were two species of *Draba*, one of which was *D. aretoides*, H. B. K., and two Composites, one being a *Culcitium*. Mr. Whymper and others have thrown some doubt upon the determination of this elevation, and it is probable that it was over-estimated. Out of forty-six species of flowering plants obtained by Sir Martin Conway, seven are from 18,000 feet or above it, two being as high as 18,700 feet. These, the highest Andine plants on record, are *Malvastrum flabellatum*, Wedd., and *Deyeuxia glacialis*, Wedd. Thirty-nine species in this collection were found above 14,000 feet; these belong to thirty-four genera and twenty-one natural orders; fifteen (*i.e.* about three-eighths of the collection) are Compositæ. Of the thirty-four genera, one only—*Blumenbachia*—is endemic to South America. The species, with one exception, are confined to the Andes, eight or nine of them not being found outside Bolivia. In the collection made by Mr. Fitzgerald's expedition in the Aconcagua valleys between 8000 and 14,000 feet, ten genera (*i.e.* one quarter of the whole) are endemic in South America. The contrast between this and the small endemic element in the Conway collection from above 14,000 feet gives additional support to the generalisation that the flora of high levels is more cosmopolitan than that of low levels.—A paper was read by Mr. E. S. Salmon on some mosses from China and Japan.

MANCHESTER.

Literary and Philosophical Society, April 24.—Prof. Horace Lamb, F.R.S., President, in the chair.—The following gentlemen were elected honorary members of the Society:—Prof. James Dewar, F.R.S., London; Prof. J. A. Ewing, F.R.S., Cambridge; Prof. A. R. Forsyth, F.R.S., Cambridge; Prof. James Geikie, F.R.S., Edinburgh; Prof. Ernst H. P. A. Haeckel, Jena; Prof. H. A. Lorentz, Leyden; Mr. Robert Ridgeway, Washington, U.S.A.; and Mr. Beauchamp Tower, London. The following were elected officers of the Society for the session 1900–1:—President, Prof. Horace Lamb, F.R.S.; vice-presidents, Prof. O. Reynolds, F.R.S.; Mr. Charles Bailey; Prof. W. Boyd Dawkins, F.R.S., and Mr. J. Cosmo Melvill; hon. secretaries, Mr. Francis Jones and Prof. A. W. Flux; treasurer, Mr. J. J. Ashworth; hon. librarian, Mr. W. E. Hoyle.

PARIS.

Academy of Sciences, April 30.—M. Maurice Lévy in the chair.—On the telescopic planets, by M. C. de Freycinet. The ideas of Laplace upon the distribution of the telescopic planets in concentric spherical layers round the sun are developed analytically and confirmed. If the asteroids are divided into three groups according to their inclination, the mean distance of the planets of these groups from the sun is sensibly constant. —On the transparency of aluminium for the radium radiation, by M. Henri Becquerel. A study of the penetration of thin aluminium sheet by the radium rays, the latter being placed in a strong magnetic field and the effects of the deviable and non-deviable rays being studied separately.—Study of manganous fluoride, by MM. Henri Moissan and Venturi. Pure anhydrous manganous fluoride, MnF_2, was obtained in four ways: by the action of a solution of hydrofluoric acid upon metallic manganese, by the interaction of gaseous hydrogen fluoride and the metal, by heating manganese fluosilicate in a current of HF at 1000°, and by dissolving manganese carbonate in the acid. The crystallised MnF_2 could not be prepared from aqueous solution, on account of the sparing solubility of the salt in water, but is readily obtainable by fusing a mixture of the salt with manganese chloride.—Agricultural maps of the Canton of Redon. The composition of the soil from the point of view of lime, magnesia, potash and nitrogen, by M. G. Lechartier. An account of the work carried out at the agricultural station of Rennes.—On the vertical trunks, stems and roots of *Cordaites*, by M. Grand'Eury. The view is put forward that *Cordaites*, like *Sigillaria* and other fossil plants dealt with in previous papers, actually grew in the place where they are found, many ligneous trees commonly regarded as growing only on dry land flourishing well with their lower portions constantly submerged in water.—Prof. Suess was nominated a Foreign Associate in the place of the late Sir Edward Frankland.—On a relation between the theory of continuous groups and the differential equations with fixed critical points, by M. Paul Painlevé.—On the function S introduced by M. Appell into the equations of dynamics, by M. A. de Saint Germain.—An improved and simplified solar microscope, by M. A. Deschamps.—The telemicroscope, by M. A. Deschamps.—On an experiment of M. Jaumann, by M. P. Villard. In an experiment described by M. Jaumann, a charged glass rod was brought near a tube immersed in oil, in which kathode rays were being developed, the bundle being repulsed. As these results were not in agreement with the usual hypotheses concerning the kathode, an attempt was made to repeat the experiments, but no deviation of the rays in the opposite direction to that predicted by the theory could be obtained.—On the radium radiation, by M. P. Villard. The rays not deviable in a magnetic field have much greater penetrative power than the deviable rays. The ordinary X-rays from a Crookes' tube behave similarly.—Luminescence of rarefied gases round a metallic wire communicating with one of the poles of an induction coil, by M. J. Borgman.—On the hysteresis and viscosity of dielectrics, by M. F. Beaulard. From the results of the experiments given, the author concludes that dielectrics do not present the phenomenon of hysteresis, but are only endowed with viscosity.—On samarium, by M. Eug. Demarçay. The properties of the samarium isolated by the method of double magnesium nitrates previously described are so well defined that it would appear to be a simple substance analogous to other elements and not a mixture. The pale yellow colour of the oxide is apparently not due to any impurity. The atomic weight, as determined by the sulphate method, is about 147·5.—On the combination of sulphur dioxide with metallic iodides, by M. E. Péchard. Potassium iodide, either in solution or in the solid state, rapidly absorbs sulphur dioxide, the compound $KI.SO_2$ being formed. This compound is easily dissociated into its constituents, its dissociation pressure at 0° being 60 cm. of mercury, at 30°, 238 cm. Other iodides form similar compounds.—On the gases emitted by the Mont Dore springs, by MM. F. Parmentier and A. Hurion. The gas is carbon dioxide containing 0·49 per cent. of nitrogen and ·01 per cent. of argon. —Bromination with aluminium bromide, by M. Ch. Pouret. Organic chlorinated compounds, heated to their boiling points for some time with aluminium bromide, give good yields of the corresponding bromine derivatives. The preparation of bromoform, methylene bromide, methyl bromide, ethyl bromide, pentabromethane, ethylene, ethylidene and acetylene bromides is described in detail.—The action of monochloracetic esters upon the sodium derivative of acetylacetone, by M. F. March. The compounds $(CH_3.CO)_2.CH.CH_2.CO.OC_2H_5$ and $(CH_3.CO)_2.CH.CH_2.CO.OCH_3$ are described; and also the products of the reaction between these bodies and phenylhydrazine.—Action of ethylidene chloride upon phenols in presence of potash, by MM. R. Fosse and J. Ettlinger.—On the presence of tyrosine in the water of contaminated wells, by M. H. Causse. The water from contaminated wells at Lyons gave an orange coloration with the chloromercurate of sodium para-diazobenzenesulphonate which proved not to be due to cystine. Tyrosine was then extracted and identified by analysis.—On some changes which occur in plants grown in the dark, by M. G. André. A set of comparative analyses of maize and lupin plants grown in sunlight and in the dark.—Studies in development of *Petromyzon Planeri*, by M. E. Bataillon.—Modifications in structure observed in cells undergoing a true fermentation, by MM. L. Matruchot and M. Molliard. The fermentation of the fruit of *Cucurbita maxima* was carried out under conditions excluding the possibility of intervention of any foreign organisms. Every cell in a state of true fermentation shows a very clear nucleus, a small amount of chromatine arranged on the periphery of the nucleus, a protoplasm full of vacuoles, and numerous minute drops of essential oil formed in the protoplasm.—Botanical zones in French Western Africa, by M. A. Chevalier.—On the granites and syenites of Madagascar, by M. A. Lacroix.—On the Gothlandian of the Peninsula of Crozon (Finisterre), by M. F. Kerforne.—Influence of temperature on the fatigue of the motor nerves of the frog, by M. J. Carvallo. Temperature has a considerable influence upon the activity of motor nerves, the excitability increasing up to 20° C.—The functions of the crystalline tube of the Acephala, by M. Henri Coupin. The function of this tube appears to be digestive, a storehouse of diastases.—Topography of the mouth as regards sensitiveness of taste, by MM. Ed. Toulouse and N. Vaschide.

AMSTERDAM.

Royal Academy of Sciences, March 31.—Prof. H. G. van de Sande Bakhuyzen in the chair.—On orthogonal comitants, by Prof. Jan de Vries.—On indigo fermentation, by Prof. Beyerinck. Indigo fermentation is the decomposition of the glucoside indican into indoxyl and glucose by the action of a cell. This is effected in two ways: first, by katabolism, *i.e.* by the direct action of the living protoplasm on the indican; secondly, by specific enzymes. All the indican splitting bacteria examined act by katabolism, and are quite inactive when dead. The indican plants and some kinds of yeast contain indigo enzymes, and so are still active when dead. The indigo enzymes of *Indigo leptostachya*, *Polygonum tinctorium*, *Phajus grandiflorus*, *Saccharomyces sphaericus*, and the emulsion of sweet almonds, which also acts feebly on indican, proved to be quite different enzymes with optima of activity at 61°, 42°, 53°, 44° and 55° C. respectively. The action of all of them is increased by acid to the amount of 0·5 c.c. normal per 100 c.c. of indican solution; more acid as well as alkali decrease their activity. In indigofera there is no katabolism, whilst in *Polygonum* there is a slight katabolism at low, in *Phajus* a very strong katabolism at high, temperatures. Hence the last two decompose indican in both ways at once, while indigofera does so by enzyme action only. In the leaves of *Phajus* indican is localised in the protoplasm both of the cells of the epidermis and of the mesophyll; the indigo enzyme occurs in the chlorophyll granules.—Prof. Hoogewerff presented on behalf of Mr. J. Hazewinkel, manager of the "experimenting station" for indigo at Klaten (Java), a paper, entitled "Indican, its splitting up, and the enzyme which brings this about." This paper contains the results of inquiries, made in 1898, which for technical reasons were not intended for publication. Beyerinck's publication makes further withholding useless. Mr. Hazewinkel observed that when all enzyme actions are excluded, an aqueous solution might be obtained from leaves of *Indigofera leptostachya*, which solution by the action of enzymes and subsequent oxidation yielded indigo. The glucoside-indican found in this solution appeared to be a fairly stable substance (also at boiling heat and when acted upon by alkalis), provided it was not exposed to the action of enzymes (indimulsin, emulsin) and of acids. Mr. Hazewinkel proved in various ways, among others by the formation of indizubine (with isatin), that the indigo-forming splitting-product of indican is indoxyl, and inquired into various circumstances influencing the detection of indoxyl in those solutions and the formation of indigo from indoxyl, and also observed that during the so-called fermentation of indigo leaves, no indican, but indoxyl is present in the fermentation fluid.—Prof. Hoogewerff also made a communication on behalf of Mr. H. ter Meulen and himself, entitled "A Contribution to the Knowledge of Indican." Basing their inquiries upon the above-mentioned inquiries by Mr. Hazewinkel and those made by Prof. Beyerinck, Prof. Hoogewerff and Mr. ter Meulen prepared pure indican from leaves of *Polygonum tinctorium*, cultivated by Prof. Beyerinck, and from indican solutions received from Mr. Hazewinkel. Indican crystallises out of an aqueous solution with 3 mol. H_2O, probably in rhombic crystals, melting at 51° and decomposing, when heated, to a higher temperature with the formation of violet vapours; it tastes bitter and is optically active, exerting a left-handed rotation. Over sulphuric acid *in vacuo* it loses its water of crystallisation; its melting point is then 100°–102°. It dissolves pretty readily in water, methyl alcohol, ethyl alcohol and acetone, and very slowly in benzole, carbon disulphide, ether or chloroform. It is represented by the formula $C_{14}H_{17}NO_6$, corresponding to the formula proposed by Marchlewski. The result obtained was 56·7 per cent. C, 5·8 per cent. H, 4·7 per cent. N; the molecular weight was determined cryoscopically. On decomposition with HCl and oxidation with air, indican yielded indirubinous indigotine. No difference was observed between indican out of *Indigofera* leaves and that obtained from *Polygonum* leaves. Further investigations were promised.—The following papers were also presented for publication in the *Proceedings*: On a special case of Monge's differential equation, by Prof. W. Kapteyn.—On the locus of the centres of hyperspherical curvature for the normal curves of *n*-dimensional hyperspace, by Prof. Schoute.—On the power of resistance of the red-blood corpuscles, by Mr. Hamburger.—(1) On behalf of Mr. J. D. van der Waals, junr., a paper on equations, containing functions for different values of the independent constant; (2) on behalf of Dr. J. Verschaffelt, a paper on the critical isotherm and the densities of saturated vapour and liquid in the case of isopentane and carbonic acid, by Prof. van der Waals.—On the 14-monthly period of the motion of the earth's pole, with determinations of the azimuth of the meridional signs of the Leyden Observatory in the years 1882–1896, by Prof. H. G. van de Sande Bakhuyzen, on behalf of Mr. J. Weeder.—Prof. Hoffman presented for publication in the *Transactions* a paper, entitled "Zur Entwicklungsgeschichte der Sympathicus."

DIARY OF SOCIETIES.

THURSDAY, MAY 10.

ROYAL SOCIETY, at 4.30.—On the Diffusion of Gold in Solid Lead at the Ordinary Temperature: Sir W. Roberts-Austen, F.R.S.—On Certain Properties of the Alloys of Gold and Copper: Sir W. Roberts-Austen, F.R.S., and Dr. T. K. Rose.—Experiments on the Value of Organic Sensation as Contributory to Emotion: Prof. Sherrington, F.R.S.—On the Brightness of the Corona of April 16, 1893. Preliminary Note: Prof. Turner, F.R.S.—The Radio-Activity of Uranium: Sir W. Crookes, F.R.S.

ROYAL INSTITUTION, at 3.—A Century of Chemistry in the Royal Institution: Prof. J. Dewar, F.R.S.

MATHEMATICAL SOCIETY, at 5.30.—Special Meeting.—The Differential Equation whose solution is the Ratio of Two Solutions of a Linear Differential Equation: M. W. J. Fry.—A Congruence Theorem relating to Eulerian Numbers and other Coefficients: Dr. Glaisher, F.R.S.—Linear Substitutions Commutative with a given Substitution: Dr. L. E. Dickson.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—A Frictionless Motor Meter: S. Evershed.

IRON AND STEEL INSTITUTE, at 10.30.—Ingots for Gun Tubes and Propeller Shafts: F. J. R. Carrulla.—The Manufacture and Application of Water-Gas: Carl Dellwik.—The Equalisation of the Temperature of Hot Blast: Lawrence Gjers and Joseph H. Harrison.—The Manganese Ores of Brazil: H. Kilburn Scott.—The Utilisation of Blast-furnace Slag: Ritter Cecil von Schwarz (Liége).

FRIDAY, MAY 11.

ROYAL ASTRONOMICAL SOCIETY, at 8.—On the Alleged Rotation of the Spiral Nebula M 51 Canum Venat: H. H. Turner.—Observations of Minor Planets at Windsor, New South Wales: John Tebbutt.—The Duration of the Greater Sun-spot Disturbances for the Years 1881 to 1899: Rev. A. L. Cortie.—Note on Measures by Prof. Barnard of Two Standard Points on the Moon's Surface: S. A. Saunder.—Micrometrical Measures of Double Stars: W. Coleman.—Diagrams for Planning Photographic Observations of Eros: A. R. Hinks.

PHYSICAL SOCIETY, at 5.—Discussion of Prof Lodge's Paper on the Controversy concerning Volta's Contact Force.—The Heat of Formation of Alloys: Mr. J. B. Tayler.—On the Want of Uniformity in the Action of Copper-Zinc Alloys on Nitric Acid: Dr. Gladstone, F.R.S.—An Electromagnetic Experiment, and Experiments illustrating the Aberration called Coma: Prof. S. P. Thompson, F.R.S.

MALACOLOGICAL SOCIETY, at 8.—On a New Species of *Despoena*, Newton (*Proserpina*, Gray): with Notes on some Allied Forms: E. R. Sykes.—On some New Mollusca from the Philippines: G. B. Sowerby.—On some Lamellibranch Remains occurring in a Sandstone from the Malay Peninsula: R. Bullen Newton.

SATURDAY, MAY 12.

ROYAL INSTITUTION, at 3.—South Africa: Past and Future: Dr Alfred P. Hillier.

MONDAY, MAY 14.

SOCIETY OF ARTS, at 8.—The Incandescent Gas Mantle and its Use: Prof. Vivian B. Lewes.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Nature and Man in British New Guinea: Prof. A. Haddon, F.R.S.

TUESDAY, MAY 15.

ROYAL INSTITUTION, at 3.—Brain Tissue considered as the Apparatus of Thought: Dr. Alex Hill.

ANTHROPOLOGICAL INSTITUTE, at 8.30.

ROYAL STATISTICAL SOCIETY, at 5.—Municipal Finance and Municipal Enterprise: Sir H. H. Fowler.

WEDNESDAY, MAY 16.

SOCIETY OF ARTS, at 8.—A National Repository for Science and Art: Prof. Flinders Petrie.

ROYAL METEOROLOGICAL SOCIETY, at 4.30.—The Wiltshire Whirlwind of October 1, 1899: the late G J. Symons, F.R.S.—The Variations of the Climate of the Geological and Historical Past and their Causes: Dr Nils Ekholm.

ROYAL MICROSCOPICAL SOCIETY, at 7.30.—Exhibition of Microscopic Pond Life.——At 8.—On the Lag in Microscopic Vision: E. M. Nelson.

THURSDAY, MAY 17.

ROYAL SOCIETY, at 4.30.

ROYAL INSTITUTION, at 3.—A Century of Chemistry at the Royal Institution: Prof. J. Dewar, F.R.S.

ZOOLOGICAL SOCIETY, at 4.30.—The Freshwater Fishes of Africa: G. A. Boulenger, F.R.S.

SOCIETY OF ARTS (Indian Section), at 4.30.—The Industrial Development of India: J. A. Baines.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Alternating Current Induction Motors: A. C. Eborall.

CHEMICAL SOCIETY, at 8.—Chlorine Derivatives of Pyridine. VI. The Orientation of some Aminochloropyridines: W. J. Sell and F. W. Dootson.

FRIDAY, MAY 18.

ROYAL INSTITUTION, at 9.—The Structure of Metals: Prof. J. A. Ewing, F.R.S.

EPIDEMIOLOGICAL SOCIETY, at 8.30.

SATURDAY, MAY 19.

ROYAL INSTITUTION, at 3.—South Africa: Past and Future: Dr. Alfred Hillier.

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